Graphical User Interface for Preclinical Data Analysis Tools

Project Management and Software Development for Medical Applications

General Info

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Project Abstract

Lately, deep learning has emerged as a powerful tool for the analysis of various forms of biomedical data. Nevertheless, current DL pipelines are still difficult to use by biologists with no coding knowledge. Therefore, the development of a user interface can greatly facilitate and accelerate the use of existing solutions. The goal of this project is to develop a user interface to unify and further develop existing scripts used for data preprocessing, deep-learning based inference, result revision and final statistical reporting under a common solution.

Background and Motivation

• An imaging field where deep learning proves itself as a valuable solution is light sheet microscopy, a novel imaging modality that can generate super-high resolution, multichannel images of mice or human samples [2]. Our lab [1] is very often relying on scripts and DL-based solutions developed in python and run from the command line. However, biologists feel most comfortable using GUI-based tools, leading to a slowness in adoption.
• Within our lab, we have developed different pipelines for processing and analyzing our data [3,4]. However, these always need to be used by computer scientists, slowing down projects, especially at high throughput of samples.
• In order to simplify the adoption of our solutions, a GUI is needed so the biologists can directly interact with the existing codebase
• The student’s task is to analyze the existing pipeline, suggest improvements, refactor existing scripts and unite them into one common, intuitive and user-friendly interface
• The project can alternatively support an “Active learning” pipeline [5]

Student’s Tasks Description

• Analyze, unite and extend current functionality under a modular and scalable tool
• Develop an intuitive, user-friendly and cross-platform user interface (Linux, Windows)
• Define a backend interface for existing and future DL solution for integration with the GUI
• Document the delivered code
• The student will get familiarized with the workflow, projects and processes in our preclinical research
• They will be introduced to current challenges in modern preclinical machine learning applications and will get insight into our lab’s current big data and ML projects, with a possible outlook for further projects or a master thesis

Technical Prerequisites

• Experience with Python
• (Alternatively, the student can propose to develop the program in another programming language that they think would be more appropriate for their skillset)
• In-depth knowledge of software development

Please send the completed proposal to ardit.ramadani@tum.de, z.l.jiang@tum.de, lennart.bastian@tum.de and tianyu.song@tum.de. Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in case of acceptance.
• Preferably experience in setting up user interfaces
• Independent and structured way of working

References


